

# **Outline for a Network Vital Signs Monitoring Plan**

Note: Chapter headings are fixed, but networks are free to organize material within each chapter as appropriate to make the plan more easily understood and organized.

## **Executive Summary**

<b>Chapter 1</b>	<b>Introduction and Background</b>
<b>Chapter 2</b>	<b>Conceptual Models</b>
<b>Chapter 3</b>	<b>Prioritization and Selection of Vital Signs</b>
<b>Chapter 4</b>	<b>Sampling Design</b>
<b>Chapter 5</b>	<b>Sampling Protocols</b>
<b>Chapter 6</b>	<b>Data Management</b>
<b>Chapter 7</b>	<b>Data Analysis and Reporting</b>
<b>Chapter 8</b>	<b>Admin./Implementation of Monitoring Program</b>
<b>Chapter 9</b>	<b>Schedule</b>
<b>Chapter 10</b>	<b>Budget</b>
<b>Chapter 11</b>	<b>Literature Cited</b>
<b>Glossary</b>	
<b>Appendices</b>	

Phase 1 = Draft Chapters 1 and 2

Phase 2 = Updated Chapters 1 and 2, plus Chapter 3



# **Spatial Sampling Designs**

## **Why do we Need Them?**

- **We can only sample a very small proportion (<<5%) of most parks; but,**
- **Our job is to protect, restore, understand, and inform others about the entire park, not just some convenient portion of it.**
- **Need to be able to make scientifically-defensible inferences to areas beyond the actual areas we sample.**

## **Sampling Design Considerations: Where and When to Sample**

The NPS recognizes the importance of collecting data in a scientifically credible manner so that they can be used to address current and future management issues. Managers, contractors and cooperators should use certain "good sampling practices" so that data meet the purpose for which they were collected and withstand scrutiny. Data collection is almost always limited by shortages of funding and personnel, and it is critical to be able to make inferences to larger areas from data collected at relatively small scales.

In February 2000, a panel of statisticians developed guidance for designing a sampling framework for monitoring natural resources in parks. Recommend the following two documents:

[Download Guidance for the Design of Sampling Schemes for Inventory and Monitoring in National Parks](#)

[Download Examples of Park Sampling Designs](#)

[Download "Examples Illustrating the Design and Analysis of Monitoring Surveys in National Parks" by Dr. Paul Geissler](#)

[Download Sample Designs for National Park Monitoring](#) by Paul Geissler and Trent McDonald

See also the [Summary of a Statistical Workshop at Olympic NP](#)

A good manual on statistical methods, [Statistical Methods for Adaptive Management Studies](#) is available from the British Columbia Ministry of Forests

A summary of key elements of the recommendations for designing a sampling scheme are as follows:

1. Some sort of probability sample should always be taken to avoid bias. Conceptually, the target population (usually the entire park) is divided into small units so that every unit in the park is included in a sampling unit, but not in more than one. The sampling design is used to select a probabilistic sample of the sampling units. Inferences about the population attributes can be produced with an estimate of their reliability. Probability samples occur when each unit in the target population has a known chance of being included in the sample, and always include a random component (such as a systematic sample with a random start). The credibility of data that are based on non-probability samples is easily undermined.
2. Statistical, design based inferences can only be made to areas that have a chance of being included in the sample. If study plots are chosen to be based on convenience, inferences can only be made to areas near roads. Since the NPS's mission is to protect resources in the entire park, sampling should be designed so that resources throughout the park and not some easily accessible portion of it. Model based inferences and professional judgement can be used to infer values in portions of a park not included in the sample. However, accuracy of model based inferences and professional judgement is only as good as the model and the decision maker. Providing the professional judgement, and models and judgement-based information can often be easily discredited by critics. Areas of the park that are not included in the sample can be simply excluded from the program, but then no inference can be made about resources in these areas.

# **Sampling Designs For National Park Monitoring**

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Presented to the George Wright Society, April 17, 2003

**DRAFT**

## **Abstract**

Grid sampling with a random start is an excellent general-purpose design, which assures that all areas of the park are fairly represented. The grid can be intensified in areas of particular interest. Issues and objectives certainly will change over time, but the sampling grid will remain constant and provide a good sample for all questions. Stratified/nonuniform probability sampling designs provide the opportunity for optimization, considering habitat differences, travel time to the plots, administrative requirements and other issues. Stratified designs will provide more precise estimates for important variables, are more flexible and can more easily target rare habitats. but grid designs are simpler and

# What Does a Phase 3 Report Look Like?

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- ~100-page document that ‘points’ to more detailed program documentation such as workshop reports, conceptual model reports, spreadsheets, questionnaires, data management plan, and **protocols**.
- Full monitoring plan that includes all 11 chapters listed in the ‘Outline for a Network Monitoring Plan’.
- Okay to implement some protocols, but have ‘Placeholders’ for other protocols; identify protocols to be developed (what, who, \$\$)
- Draft due to WASO on December 15, 2004; another 9 months allowed for peer review and revisions before implementation.
- Satisfies new GPRA goal 1b3, “Implement vital signs monitoring”

# **Why do we need Monitoring Protocols?**

- Necessary for the program to be credible, so that data stand up to external review
- Necessary to detect changes over time and for the program to survive changeovers in personnel
- Necessary to allow comparisons of data among places/agencies

Designing a Monitoring Program requires a large up-front investment that should be represented in the protocol document

- Clear statement of questions being asked, including Measurable Objectives
- Sampling framework/design
- Step-by-step procedures for collecting, managing and analyzing the resulting data
- Expectations/examples for presenting the data in graphs, tables, reports
- Personnel requirements and training
- Operation requirements: scheduling, equipment needs, startup costs and budget requirements

# Web-based Clearinghouse of Protocols and Database Components

Amphibian Call Counts	<u>Protocol</u>	<u>Database*</u>	<u>Data Analysis</u>
Bird VCP counts	<u>Protocol</u>	<u>Database</u>	<u>Data Analysis</u>
Breeding Bird Survey	<u>Protocol</u>	<u>Database</u>	<u>Data Analysis</u>
Coral reef video sampling	<u>Protocol</u>	<u>Database</u>	<u>Data Analysis</u>
Rare plants	<u>Protocol</u>	<u>Database</u>	<u>Data Analysis</u>
Rare plants	<u>Protocol</u>	<u>Database</u>	<u>Data Analysis</u>
Weather	<u>Protocol</u>	<u>Database</u>	<u>Data Analysis</u>
Weather	<u>Protocol</u>	<u>Database</u>	<u>Data Analysis</u>
Weather	<u>Protocol</u>	<u>Database</u>	<u>Data Analysis</u>

\* Database is an MS Access .mdb file with tables, queries, forms, reports designed for a particular protocol.



# The National Park Service

## Inventory and Monitoring

### PROTOCOL DATABASE

<i>PROTOCOL NAME</i>	<i>PARK</i>	<i>STATUS</i>	<i>SUMMARY</i>	<i>PROTOCOL</i>	<i>MS ACCESS</i>	<i>ANALYSIS</i>
Air Quality	DENA	Completed	<a href="#">Summary</a>			
Amphibians	NOCA	R&D Phase	<a href="#">Summary</a>			
Amphibians	CACO	Completed	<a href="#">Summary</a>	<a href="#">Protocol</a>		
Bald Eagles	NOCA	Completed	<a href="#">Summary</a>			
Bats	ORPI	Completed	<a href="#">Summary</a>	<a href="#">Protocol</a>		
Black Bear	GRSM	Completed	<a href="#">Summary</a>			
Black-tailed Prairie Dog	PRCL	Completed	<a href="#">Summary</a>	<a href="#">Protocol</a>		
Coral Colonies	VIIS	R&D Phase	<a href="#">Summary</a>	<a href="#">Protocol</a>		
Coral Reefs	VIIS	Completed	<a href="#">Summary</a>	<a href="#">Protocol</a>		
Coral Reefs - AquaMap Underwater Mapping/Relocation	VIIS	Completed	<a href="#">Summary</a>	<a href="#">Protocol</a>		

Land Birds - MAPS	CACO	R&D Phase	<a href="#">Summary</a>	<a href="#">Protocol</a>		
Land Birds - Point Counts	CACO	R&D Phase	<a href="#">Summary</a>			
Land Birds - vcp counts	MANY	R&D Phase	<a href="#">Summary</a>	<a href="#">Protocol</a>	<a href="#">MsAccess</a>	
Mammals - Canids/Meso	CACO	R&D Phase	<a href="#">Summary</a>			
Marsh Sedimentation and Sea Level	CACO	R&D Phase	<a href="#">Summary</a>			
Meteorological and Atmospheric Monitoring	CACO	Completed	<a href="#">Summary</a>	<a href="#">Protocol</a>		

<http://www.nature.nps.gov/im/monitor>



# The National Park Service **Inventory & Monitoring**

## Black-tailed Prairie Dog

### *REFERENCE*

Plumb, G.E., G.D. Willson, K. Kalin, K. Shinn, and W.M. Rizzo. 2001. Black-tailed prairie dog monitoring protocol for seven prairie parks. U.S. Geological Survey, Northern Prairie Wildlife Research Center, Missouri Field Station, Columbia, MO. 27 p.

### *DESCRIPTION*

Protocol designed to (1) provide relatively simple and cost-effective procedure for estimating density and total size of black-tailed prairie dog colonies, (2) delineate and map edges of colonies, (3) provide low-level surveillance of sylvatic plague. The maximum numbers of individuals that are observed during three consecutive mornings of colony surveillance each year are used to calculate population sizes and densities. Extent of both the clip line and active burrow line are mapped annually using GPS.

# Black-tailed Prairie Dog Monitoring Protocol for Seven Prairie Parks

Northern Prairie Wildlife Research Center Inventory and Monitoring Protocol



## Black-tailed Prairie Dog Monitoring Protocol for Seven Prairie Parks

by

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Wildlife Society Bulletin:            Monitoring protocol guidelines • Oakley et al.

## **Guidelines for long-term monitoring protocols**

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**Abstract:** Monitoring protocols are detailed study plans that explain how data are to be collected, managed, analyzed, and reported, and are a key component of quality assurance for natural resource monitoring programs. Protocols are necessary to be certain that changes detected by monitoring are actually occurring in nature, and not simply a result of measurements being taken by different people or in slightly different ways. We developed and present here guidelines for the recommended content and format of monitoring protocols. The National Park Service and United States Geological Survey have adopted these guidelines to assist scientists developing protocols for more than 270 national park units.

Table 1. Guidelines for long-term monitoring protocols: recommended content of the protocol narrative.

## 1. Background and Objectives

- a. Background/history; describe resource issue being addressed
- b. Rationale for selecting this resource to monitor
- c. Measurable objectives

## 2. Sampling Design

- a. Rationale for selecting this sampling design over others
- b. Site selection
  - i. Criteria for site selection; define the boundaries or “population” being sampled
  - ii. Procedures for selecting sampling locations; stratification, spatial design
- c. Sampling Frequency and Replication
- d. Recommended number and location of sampling sites
- e. Recommended frequency and timing of sampling
- f. Level of change that can be detected for the amount/type of sampling being instituted.

## 3. Field Methods

- a. Field season preparations and equipment setup (including permitting/compliance procedures)
- b. Sequence of events during field season
- c. Details of taking measurements, with example field forms
- d. Post-collection processing of samples (e.g., lab analysis, preparing voucher specimens)
- e. End-of-season procedures

4. Data Handling, Analysis and Reporting
  - a. Metadata procedures
  - b. Overview of database design
  - c. Data entry, verification and editing
  - d. Recommendations for routine data summaries and statistical analyses to detect change
  - e. Recommended reporting schedule
  - f. Recommended report format with examples of summary tables and figures
  - g. Recommended methods for long-term trend analysis (e.g., every 5 or 10 years)
  - h. Data archival procedures
5. Personnel Requirements and Training
  - a. Roles and responsibilities
  - b. Qualifications
  - c. Training procedures
6. Operational Requirements
  - a. Annual workload and field schedule
  - b. Facility and equipment needs
  - c. Startup costs and budget considerations
7. References

# Recommended Protocol Format

- **Protocol Narrative**
  - Overview of the various components of the protocol
- **Series of Standard Operating Procedures (SOPs)**
  - Written in the form of instructions with step-by-step details of how to carry out the procedure
  - Number and content of SOPs determined by PIs
  - One of the SOPs should describe procedures for making protocol revisions and archiving versions
- **Supplementary Materials**
  - example databases, maps, photographs, etc.

# **Protocol Narrative**

- Background and Objectives
- Sampling Design
- Field Methods
- Data Handling, Analysis and Reporting
- Personnel Requirements and Training
- Operational Requirements
- References

# Standard Operating Procedures (SOPs)

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- Number and content of SOPs determined by PIs
- Written in the form of instructions with step-by-step details of how to carry out the procedure
- One of the SOPs should describe procedures for making protocol revisions and archiving versions

U.S. Department of the Interior  
National Park Service

**Bird Monitoring Protocol for Agate Fossil Beds National Monument,  
Nebraska and Tallgrass Prairie National Preserve, Kansas**

Prepared by:

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For the:

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# Table of Contents:

## **I. Background and Objectives**

Issue being Addressed and Rationale for Monitoring Grassland Bird Populations  
Measurable objectives

## **II. Sampling Design**

Rationale for selecting this sampling design over others; Site Selection  
Population being Monitored; Sampling Frequency and Replication  
Level of Change that can be Detected for the Amount/Type of Sampling being Instituted

## **III. Field Methods**

Field season preparations and equipment setup  
Sequence of events during field season  
Details of taking measurements, with example field forms

## **IV. Data Management**

Overview of database design; Data entry, verification and editing  
Metadata procedures; Data archival procedures

## **V. Analysis and Reporting**

Recommendations for routine data summaries and statistical analyses to detect change  
Recommended report format with examples of summary tables and figures  
Recommended methods for long-term trend analysis (e.g., every 5 or 10 years)

## **VI. Personnel Requirements and Training**

Roles and responsibilities  
Qualifications and Training

## **VII. Operational Requirements**

Annual workload and field schedule  
Facility and equipment needs  
Startup Costs and Budget Considerations  
Procedures for Making Changes to and Archiving Previous Versions of the Protocol

## **VIII. References**

**Important Note:** This sampling protocol consists of this Protocol Narrative and the following Standard Operating Procedures (SOPs):

- SOP 1: Before the Field Season
- SOP 2: Field Season Schedule
- SOP 3: Training Observers
- SOP 4: Establishing and Marking Sampling Plots
- SOP 5: Conducting the Variable Circular Plot Count
- SOP 6: Documenting Habitat Variables
- SOP 7: Data Management
- SOP 8: Data Analysis
- SOP 9: Reporting
- SOP 10: After the Field Season
- SOP 11: Procedures for Changing the Procedures

# **Bird Monitoring Protocol for Agate Fossil Beds National Monument, Nebraska and Tallgrass Prairie National Preserve, Kansas**

## **Standard Operating Procedure (SOP) # 5**

### **Conducting the Count**

**Version 0.1 (December 20, 2001)**

This SOP gives step-by-step instructions for conducting 5-minute bird counts at Agate Fossil Beds NM and Tallgrass Prairie NP using the Variable Circular Plot (VCP) methodology. The SOP describes the procedure for collecting data and filling in the data form “Field Data Form – Variable Circular Plot Counts” (Form 1).

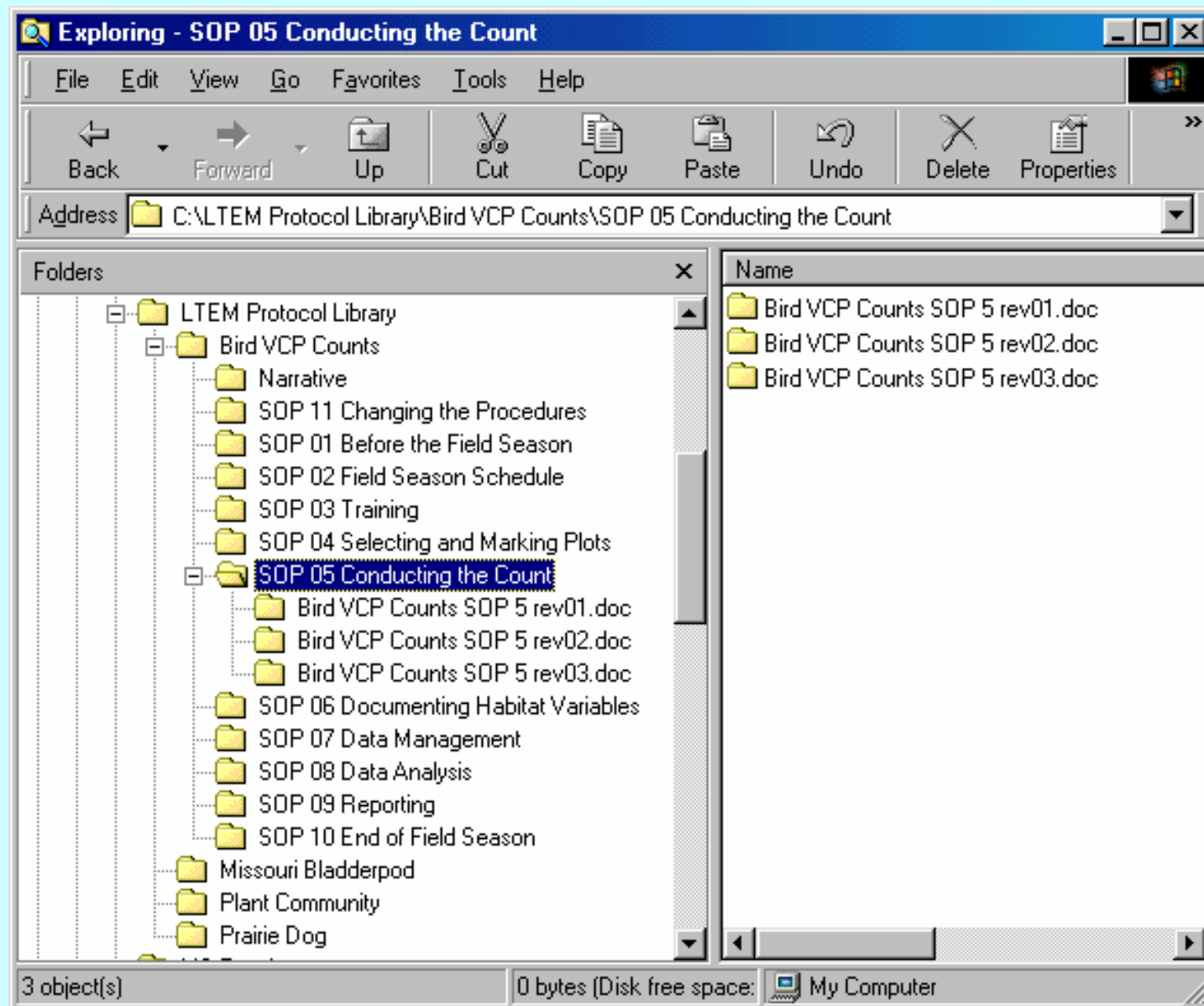
#### **Revision History Log:**

Prev. Version #	Revision Date	Author	Changes Made	Reason for Change	New Version #

Conditions: Temperature (C): 8.0 Wind (0-6): 1 Rain (0-5): 0 Clouds (0-100): 30 N

[illegible]

# Procedure for Making Changes to the Procedures



# Reporting the Results of I&M Efforts

Making Data, Information Available for Decision-Makers,  
Scientists, Educators, and various Constituency Groups

- Annual Administrative Report and Work Plan
- Annual Reports for specific Protocols or Projects
- Inventory Project Reports
- Analysis and Synthesis reports – trends
- Program and Protocol Review reports
- Scientific journal articles and book chapters
- Symposia, workshops and conferences
- National Report - Condition of NR in National Parks
- Websites